

Fig. 1 A

Wild	1	MATTAATAAALSAATAKTGRKNHQRHHVLPARGRVGAAVRC SAVSPVTPPSPAPPAT	60
P/R Mutant	1	MATTAATAAALSAATAKTGRKNHQRHHVLPARGRVGAAVRC SAVSPVTPPSPAPPAT	60
P/W Mutant	1	MATTAATAAALSAATAKTGRKNHQRHHVLPARGRVGAAVRC SAVSPVTPPSPAPPAT	60
P/S Mutant	1	MATTAATAAALSAATAKTGRKNHQRHHVLPARGRVGAAVRC SAVSPVTPPSPAPPAT	60
P/S/W Mutant	1	MATTAATAAALSAATAKTGRKNHQRHHVLPARGRVGAAVRC SAVSPVTPPSPAPPAT	60

Wild	61	PLRPWGPAEPRKGADILVEALERC GVSDFAYPGGASMEI HQALTRSPVITNHLFRHEQG	120
P/R Mutant	61	PLRPWGPAEPRKGADILVEALERC GVSDFAYPGGASMEI HQALTRSPVITNHLFRHEQG	120
P/W Mutant	61	PLRPWGPAEPRKGADILVEALERC GVSDFAYPGGASMEI HQALTRSPVITNHLFRHEQG	120
P/S Mutant	61	PLRPWGPAEPRKGADILVEALERC GVSDFAYPGGASMEI HQALTRSPVITNHLFRHEQG	120
P/S/W Mutant	61	PLRPWGPAEPRKGADILVEALERC GVSDFAYPGGASMEI HQALTRSPVITNHLFRHEQG	120

Wild	121	EAFASGYARASGRVGVCVATSGPGATNLVSALADALLDSVPMVAITGQVPRRMIGTDAF	180
P/R Mutant	121	EAFASGYARASGRVGVCVATSGPGATNLVSALADALLDSVPMVAITGQVHRRMIGTDAF	180
P/W Mutant	121	EAFASGYARASGRVGVCVATSGPGATNLVSALADALLDSVPMVAITGQVHRRMIGTDAF	180
P/S Mutant	121	EAFASGYARASGRVGVCVATSGPGATNLVSALADALLDSVPMVAITGQVHRRMIGTDAF	180
P/S/W Mutant	121	EAFASGYARASGRVGVCVATSGPGATNLVSALADALLDSVPMVAITGQVHRRMIGTDAF	180
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Wild	181	QETPIVEVTRSITKHNYLVLDVEDIPRVIQEAFFLASSGRPGPVLVDIPKDIOQQMAVPV	240
P/R Mutant	181	QETPIVEVTRSITKHNYLVLDVEDIPRVIQEAFFLASSGRPGPVLVDIPKDIOQQMAVPV	240
P/W Mutant	181	QETPIVEVTRSITKHNYLVLDVEDIPRVIQEAFFLASSGRPGPVLVDIPKDIOQQMAVPV	240
P/S Mutant	181	QETPIVEVTRSITKHNYLVLDVEDIPRVIQEAFFLASSGRPGPVLVDIPKDIOQQMAVPV	240
P/S/W Mutant	181	QETPIVEVTRSITKHNYLVLDVEDIPRVIQEAFFLASSGRPGPVLVDIPKDIOQQMAVPV	240

Wild	241	WDTSMNLPGYIARLPKPPATELLEQVRLRVGESRRPILYVGGGCSASGDELRFVLTGI	300
P/R Mutant	241	WDTSMNLPGYIARLPKPPATELLEQVRLRVGESRRPILYVGGGCSASGDELRFVLTGI	300
P/W Mutant	241	WDTSMNLPGYIARLPKPPATELLEQVRLRVGESRRPILYVGGGCSASGDELRFVLTGI	300
P/S Mutant	241	WDTSMNLPGYIARLPKPPATELLEQVRLRVGESRRPILYVGGGCSASGDELRFVLTGI	300
P/S/W Mutant	241	WDTSMNLPGYIARLPKPPATELLEQVRLRVGESRRPILYVGGGCSASGDELRFVLTGI	300

Wild	301	PVTTTLMGLGNFSPDDPLSLRMLGMHGTYYANYAVDKADLLAFGVRFDDRVTGKIEAFA	360
P/R Mutant	301	PVTTTLMGLGNFSPDDPLSLRMLGMHGTYYANYAVDKADLLAFGVRFDDRVTGKIEAFA	360
P/W Mutant	301	PVTTTLMGLGNFSPDDPLSLRMLGMHGTYYANYAVDKADLLAFGVRFDDRVTGKIEAFA	360
P/S Mutant	301	PVTTTLMGLGNFSPDDPLSLRMLGMHGTYYANYAVDKADLLAFGVRFDDRVTGKIEAFA	360
P/S/W Mutant	301	PVTTTLMGLGNFSPDDPLSLRMLGMHGTYYANYAVDKADLLAFGVRFDDRVTGKIEAFA	360

Wild	361	SRAKIVHIDIDPAEIGKNKOPHVSICADV K LALQGLNALLQQSTTKTSSDFS AWHNELDQ	420
P/R Mutant	361	SRAKIVHIDIDPAEIGKNKOPHVSICADV K LALQGLNALLQQSTTKTSSDFS AWHNELDQ	420
P/W Mutant	361	SRAKIVHIDIDPAEIGKNKOPHVSICADV K LALQGLNALLQQSTTKTSSDFS AWHNELDQ	420
P/S Mutant	361	SRAKIVHIDIDPAEIGKNKOPHVSICADV K LALQGLNALLQQSTTKTSSDFS AWHNELDQ	420
P/S/W Mutant	361	SRAKIVHIDIDPAEIGKNKOPHVSICADV K LALQGLNALLQQSTTKTSSDFS AWHNELDQ	420

Wild	421	QKREFPLGYKTFGEEIPPOYAIQVLDLTKGEAIIATGVGQHQMWA AQYYTYKRPROWLS	480
P/R Mutant	421	QKREFPLGYKTFGEEIPPOYAIQVLDLTKGEAIIATGVGQHQMWA AQYYTYKRPROWLS	480
P/W Mutant	421	QKREFPLGYKTFGEEIPPOYAIQVLDLTKGEAIIATGVGQHQMWA AQYYTYKRPROWLS	480
P/S Mutant	421	QKREFPLGYKTFGEEIPPOYAIQVLDLTKGEAIIATGVGQHQMWA AQYYTYKRPROWLS	480
P/S/W Mutant	421	QKREFPLGYKTFGEEIPPOYAIQVLDLTKGEAIIATGVGQHQMWA AQYYTYKRPROWLS	480

Wild	481	SAGLGAMGFGLPAAAGASVANPGVTVDIDGDSFLMNIQELALIRIENLPVKVMVLNNQ	540
P/R Mutant	481	SAGLGAMGFGLPAAAGASVANPGVTVDIDGDSFLMNIQELALIRIENLPVKVMVLNNQ	540
P/W Mutant	481	SAGLGAMGFGLPAAAGASVANPGVTVDIDGDSFLMNIQELALIRIENLPVKVMVLNNQ	540

Fig. 1 B

P/S Mutant	481	SAGLGAMGFGLPAAAGASVANPGVTVVDIDGGSFLMNIQELALIRIENLPVKVMVLNNQ	540
P/S/W Mutant	481	SAGLGAMGFGLPAAAGASVANPGVTVVDIDGGSFLMNIQELALIRIENLPVKVMVLNNQ	540

Wild	541	HLGMVVQWEDRFYKANRAHTYLGNPECESEIYPDFVTIAKGFNIPAVRVTKKSEVRAAIK	600
P/R Mutant	541	HLGMVVQWEDRFYKANRAHTYLGNPECESEIYPDFVTIAKGFNIPAVRVTKKSEVRAAIK	600
P/W Mutant	541	HLGMVVQLED RFYKANRAHTYLGNPECESEIYPDFVTIAKGFNIPAVRVTKKSEVRAAIK	600
P/S Mutant	541	HLGMVVQWEDRFYKANRAHTYLGNPECESEIYPDFVTIAKGFNIPAVRVTKKSEVRAAIK	600
P/S/W Mutant	541	HLGMVVQLED RFYKANRAHTYLGNPECESEIYPDFVTIAKGFNIPAVRVTKKSEVRAAIK	600

Wild	601	KMLETPGPYLLDIIVPHQEHVLPMPISGGAFKDMILDGDGRTVY	644
P/R Mutant	601	KMLETPGPYLLDIIVPHQEHVLPMPISGGAFKDMILDGDGRTVY	644
P/W Mutant	601	KMLETPGPYLLDIIVPHQEHVLPMPISGGAFKDMILDGDGRTVY	644
P/S Mutant	601	KMLETPGPYLLDIIVPHQEHVLPMPISGGAFKDMILDGDGRTVY	644
P/S/W Mutant	601	KMLETPGPYLLDIIVPHQEHVLPMPISGGAFKDMILDGDGRTVY	644

Fig. 2 A

Wild	1	CCCAAACCCAGAAACCCCTCGCCGCGCGCGCGCGCCACCACCCACCATGGCTACGACCG	60
P/R Mutation	1	CCCAAACCCAGAAACCCCTCGCCGCGCGCGCGCGCCACCACCCACCATGGCTACGACCG	60
P/W Mutation	1	CCCAAACCCAGAAACCCCTCGCCGCGCGCGCGCGCCACCACCCACCATGGCTACGACCG	60
P/S Mutation	1	CCCAAACCCAGAAACCCCTCGCCGCGCGCGCGCGCCACCACCCACCATGGCTACGACCG	60
P/W/S Mutation	1	CCCAAACCCAGAAACCCCTCGCCGCGCGCGCGCGCCACCACCCACCATGGCTACGACCG	60

Wild	61	CCGCGGCGCGCGCGCGCGCCCTGTCCGCGCGCGCGCGGCAAGACCGGCCGTAAAGAACC	120
P/R Mutation	61	CCGCGGCGCGCGCGCGCGCCCTGTCCGCGCGCGCGCGGCAAGACCGGCCGTAAAGAACC	120
P/W Mutation	61	CCGCGGCGCGCGCGCGCGCCCTGTCCGCGCGCGCGCGGCAAGACCGGCCGTAAAGAACC	120
P/S Mutation	61	CCGCGGCGCGCGCGCGCGCCCTGTCCGCGCGCGCGCGGCAAGACCGGCCGTAAAGAACC	120
P/W/S Mutation	61	CCGCGGCGCGCGCGCGCGCCCTGTCCGCGCGCGCGCGGCAAGACCGGCCGTAAAGAACC	120

Wild	121	ACCAGCGACACCAACGTCCTTCCCGCTCGAGGCGCGGGTGGGGGCGCGCGGTCAGGTGCT	180
P/R Mutation	121	ACCAGCGACACCAACGTCCTTCCCGCTCGAGGCGCGGGTGGGGGCGCGCGGTCAGGTGCT	180
P/W Mutation	121	ACCAGCGACACCAACGTCCTTCCCGCTCGAGGCGCGGGTGGGGGCGCGCGGTCAGGTGCT	180
P/S Mutation	121	ACCAGCGACACCAACGTCCTTCCCGCTCGAGGCGCGGGTGGGGGCGCGCGGTCAGGTGCT	180
P/W/S Mutation	121	ACCAGCGACACCAACGTCCTTCCCGCTCGAGGCGCGGGTGGGGGCGCGCGGTCAGGTGCT	180

Wild	181	CGGCGGTGTCCCGGTCACCCGCGCGTCCCGGCGCGCGCGGCCACGCGCTCCGGCCGT	240
P/R Mutation	181	CGGCGGTGTCCCGGTCACCCGCGCGTCCCGGCGCGCGCGGCCACGCGCTCCGGCCGT	240
P/W Mutation	181	CGGCGGTGTCCCGGTCACCCGCGCGTCCCGGCGCGCGCGGCCACGCGCTCCGGCCGT	240
P/S Mutation	181	CGGCGGTGTCCCGGTCACCCGCGCGTCCCGGCGCGCGCGGCCACGCGCTCCGGCCGT	240
P/W/S Mutation	181	CGGCGGTGTCCCGGTCACCCGCGCGTCCCGGCGCGCGCGGCCACGCGCTCCGGCCGT	240

Wild	241	GGGGGCGGCGCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCGCTGGAGCGGTGCG	300
P/R Mutation	241	GGGGGCGGCGCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCGCTGGAGCGGTGCG	300
P/W Mutation	241	GGGGGCGGCGCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCGCTGGAGCGGTGCG	300
P/S Mutation	241	GGGGGCGGCGCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCGCTGGAGCGGTGCG	300
P/W/S Mutation	241	GGGGGCGGCGCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCGCTGGAGCGGTGCG	300

Wild	301	CGGTACGCGACGTGTTCCGCTACCCGGGCGGCGGTCCATGGAGATCCACCAAGGCGCTGA	360
P/R Mutation	301	CGGTACGCGACGTGTTCCGCTACCCGGGCGGCGGTCCATGGAGATCCACCAAGGCGCTGA	360
P/W Mutation	301	CGGTACGCGACGTGTTCCGCTACCCGGGCGGCGGTCCATGGAGATCCACCAAGGCGCTGA	360
P/S Mutation	301	CGGTACGCGACGTGTTCCGCTACCCGGGCGGCGGTCCATGGAGATCCACCAAGGCGCTGA	360
P/W/S Mutation	301	CGGTACGCGACGTGTTCCGCTACCCGGGCGGCGGTCCATGGAGATCCACCAAGGCGCTGA	360

Wild	361	CGCGCTCCCGGTCATACCAACCACTCTTCCGCCACGAGCAGGGCGAGGCGTTCCGCGG	420
P/R Mutation	361	CGCGCTCCCGGTCATACCAACCACTCTTCCGCCACGAGCAGGGCGAGGCGTTCCGCGG	420
P/W Mutation	361	CGCGCTCCCGGTCATACCAACCACTCTTCCGCCACGAGCAGGGCGAGGCGTTCCGCGG	420
P/S Mutation	361	CGCGCTCCCGGTCATACCAACCACTCTTCCGCCACGAGCAGGGCGAGGCGTTCCGCGG	420
P/W/S Mutation	361	CGCGCTCCCGGTCATACCAACCACTCTTCCGCCACGAGCAGGGCGAGGCGTTCCGCGG	420

Wild	421	CGTCCGGGTACGCGCGCGCGTCCGGCGCGTCCGGGTCTGCGTCGCCACCTCCGGCCCCG	480
P/R Mutation	421	CGTCCGGGTACGCGCGCGCGTCCGGCGCGTCCGGGTCTGCGTCGCCACCTCCGGCCCCG	480
P/W Mutation	421	CGTCCGGGTACGCGCGCGCGTCCGGCGCGTCCGGGTCTGCGTCGCCACCTCCGGCCCCG	480
P/S Mutation	421	CGTCCGGGTACGCGCGCGCGTCCGGCGCGTCCGGGTCTGCGTCGCCACCTCCGGCCCCG	480
P/W/S Mutation	421	CGTCCGGGTACGCGCGCGCGTCCGGCGCGTCCGGGTCTGCGTCGCCACCTCCGGCCCCG	480

Wild	481	GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGGTCG	540
P/R Mutation	481	GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGGTCG	540
P/W Mutation	481	GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGGTCG	540
P/S Mutation	481	GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGGTCG	540
P/W/S Mutation	481	GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGGTCG	540

Wild	541	CCATCACGGGCCAGGTCCCGCGCGCATGATCGGCACCGACGCTTCCAGGAGACGCCCA	600
P/R Mutation	541	CCATCACGGGCCAGGTCCCGCGCGCATGATCGGCACCGACGCTTCCAGGAGACGCCCA	600
P/W Mutation	541	CCATCACGGGCCAGGTCCCGCGCGCATGATCGGCACCGACGCTTCCAGGAGACGCCCA	600
P/S Mutation	541	CCATCACGGGCCAGGTCCCGCGCGCATGATCGGCACCGACGCTTCCAGGAGACGCCCA	600
P/W/S Mutation	541	CCATCACGGGCCAGGTCCCGCGCGCATGATCGGCACCGACGCTTCCAGGAGACGCCCA	600

Wild	601	TAGTCGAGGTACCCGCTCCATCACCAGCACAATTACCTTGTCTTGTATGTGGAGGACA	660
P/R Mutation	601	TAGTCGAGGTACCCGCTCCATCACCAGCACAATTACCTTGTCTTGTATGTGGAGGACA	660
P/W Mutation	601	TAGTCGAGGTACCCGCTCCATCACCAGCACAATTACCTTGTCTTGTATGTGGAGGACA	660

Fig. 2 B

P/S Mutation	601	TAGTCGAGGTCACCCGCTCCATCACCAGCACAATTACCTTGTCTTGATGTGGAGGACA	660
P/W/S Mutation	601	TAGTCGAGGTCACCCGCTCCATCACCAGCACAATTACCTTGTCTTGATGTGGAGGACA	660

Wild	661	TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCCTCGGGCCGCTCTGGCCCGGTGC	720
P/R Mutation	661	TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCCTCGGGCCGCTCTGGCCCGGTGC	720
P/W Mutation	661	TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCCTCGGGCCGCTCTGGCCCGGTGC	720
P/S Mutation	661	TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCCTCGGGCCGCTCTGGCCCGGTGC	720
P/W/S Mutation	661	TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCCTCGGGCCGCTCTGGCCCGGTGC	720

Wild	721	TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA	780
P/R Mutation	721	TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA	780
P/W Mutation	721	TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA	780
P/S Mutation	721	TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA	780
P/W/S Mutation	721	TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA	780

Wild	781	TGAATCTACCAGGGTACATCGCAGCGCTGCCAAGCCACCCGCGACAGAATTGCTTGAGC	840
P/R Mutation	781	TGAATCTACCAGGGTACATCGCAGCGCTGCCAAGCCACCCGCGACAGAATTGCTTGAGC	840
P/W Mutation	781	TGAATCTACCAGGGTACATCGCAGCGCTGCCAAGCCACCCGCGACAGAATTGCTTGAGC	840
P/S Mutation	781	TGAATCTACCAGGGTACATCGCAGCGCTGCCAAGCCACCCGCGACAGAATTGCTTGAGC	840
P/W/S Mutation	781	TGAATCTACCAGGGTACATCGCAGCGCTGCCAAGCCACCCGCGACAGAATTGCTTGAGC	840

Wild	841	AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTGGTGGTGGCTGCT	900
P/R Mutation	841	AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTGGTGGTGGCTGCT	900
P/W Mutation	841	AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTGGTGGTGGCTGCT	900
P/S Mutation	841	AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTGGTGGTGGCTGCT	900
P/W/S Mutation	841	AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTGGTGGTGGCTGCT	900

Wild	901	CTGCATCTGGTGACGAATTGCGCTGGTTTGTGAGCTGACTGGTATCCAGTTACAACCA	960
P/R Mutation	901	CTGCATCTGGTGACGAATTGCGCTGGTTTGTGAGCTGACTGGTATCCAGTTACAACCA	960
P/W Mutation	901	CTGCATCTGGTGACGAATTGCGCTGGTTTGTGAGCTGACTGGTATCCAGTTACAACCA	960
P/S Mutation	901	CTGCATCTGGTGACGAATTGCGCTGGTTTGTGAGCTGACTGGTATCCAGTTACAACCA	960
P/W/S Mutation	901	CTGCATCTGGTGACGAATTGCGCTGGTTTGTGAGCTGACTGGTATCCAGTTACAACCA	960

Wild	961	CTCTGATGGGCCTCGGCAATTTCCCAAGTGACGACCCGTTGTCCCTGCGCATGCTTGGGA	1020
P/R Mutation	961	CTCTGATGGGCCTCGGCAATTTCCCAAGTGACGACCCGTTGTCCCTGCGCATGCTTGGGA	1020
P/W Mutation	961	CTCTGATGGGCCTCGGCAATTTCCCAAGTGACGACCCGTTGTCCCTGCGCATGCTTGGGA	1020
P/S Mutation	961	CTCTGATGGGCCTCGGCAATTTCCCAAGTGACGACCCGTTGTCCCTGCGCATGCTTGGGA	1020
P/W/S Mutation	961	CTCTGATGGGCCTCGGCAATTTCCCAAGTGACGACCCGTTGTCCCTGCGCATGCTTGGGA	1020

Wild	1021	TGCATGGCACGGGTGACGCAAAATTATGCCGTGGATAAAGGCTGACCTGTTGCTTGCCTTTG	1080
P/R Mutation	1021	TGCATGGCACGGGTGACGCAAAATTATGCCGTGGATAAAGGCTGACCTGTTGCTTGCCTTTG	1080
P/W Mutation	1021	TGCATGGCACGGGTGACGCAAAATTATGCCGTGGATAAAGGCTGACCTGTTGCTTGCCTTTG	1080
P/S Mutation	1021	TGCATGGCACGGGTGACGCAAAATTATGCCGTGGATAAAGGCTGACCTGTTGCTTGCCTTTG	1080
P/W/S Mutation	1021	TGCATGGCACGGGTGACGCAAAATTATGCCGTGGATAAAGGCTGACCTGTTGCTTGCCTTTG	1080

Wild	1081	GTGTGCGGTTTGATGATCGTGTGACAGGGAAAAATTGAGGCTTTTGAAGCAGGGCCAAGA	1140
P/R Mutation	1081	GTGTGCGGTTTGATGATCGTGTGACAGGGAAAAATTGAGGCTTTTGAAGCAGGGCCAAGA	1140
P/W Mutation	1081	GTGTGCGGTTTGATGATCGTGTGACAGGGAAAAATTGAGGCTTTTGAAGCAGGGCCAAGA	1140
P/S Mutation	1081	GTGTGCGGTTTGATGATCGTGTGACAGGGAAAAATTGAGGCTTTTGAAGCAGGGCCAAGA	1140
P/W/S Mutation	1081	GTGTGCGGTTTGATGATCGTGTGACAGGGAAAAATTGAGGCTTTTGAAGCAGGGCCAAGA	1140

Wild	1141	TTGTGCACATTGACATTGATCCAGCAGAGATTGGAAGAACAAGCAACCACATGTGTCAA	1200
P/R Mutation	1141	TTGTGCACATTGACATTGATCCAGCAGAGATTGGAAGAACAAGCAACCACATGTGTCAA	1200
P/W Mutation	1141	TTGTGCACATTGACATTGATCCAGCAGAGATTGGAAGAACAAGCAACCACATGTGTCAA	1200
P/S Mutation	1141	TTGTGCACATTGACATTGATCCAGCAGAGATTGGAAGAACAAGCAACCACATGTGTCAA	1200
P/W/S Mutation	1141	TTGTGCACATTGACATTGATCCAGCAGAGATTGGAAGAACAAGCAACCACATGTGTCAA	1200

Wild	1201	TTTGGCGAGATGTTAAGCTTGCTTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA	1260
P/R Mutation	1201	TTTGGCGAGATGTTAAGCTTGCTTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA	1260
P/W Mutation	1201	TTTGGCGAGATGTTAAGCTTGCTTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA	1260
P/S Mutation	1201	TTTGGCGAGATGTTAAGCTTGCTTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA	1260
P/W/S Mutation	1201	TTTGGCGAGATGTTAAGCTTGCTTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA	1260

Wild	1261	CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT	1320
P/R Mutation	1261	CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT	1320

Fig. 2 C

P/W Mutation	1261	CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT	1320
P/S Mutation	1261	CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT	1320
P/W/S Mutation	1261	CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT	1320

Wild	1321	TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCCACCGCAATATGCCATTAGGTTGC	1380
P/R Mutation	1321	TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCCACCGCAATATGCCATTAGGTTGC	1380
P/W Mutation	1321	TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCCACCGCAATATGCCATTAGGTTGC	1380
P/S Mutation	1321	TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCCACCGCAATATGCCATTAGGTTGC	1380
P/W/S Mutation	1321	TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCCACCGCAATATGCCATTAGGTTGC	1380

Wild	1381	TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT	1440
P/R Mutation	1381	TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT	1440
P/W Mutation	1381	TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT	1440
P/S Mutation	1381	TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT	1440
P/W/S Mutation	1381	TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT	1440

Wild	1441	GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGGCTGTCTTCGGCTGGTCTGG	1500
P/R Mutation	1441	GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGGCTGTCTTCGGCTGGTCTGG	1500
P/W Mutation	1441	GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGGCTGTCTTCGGCTGGTCTGG	1500
P/S Mutation	1441	GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGGCTGTCTTCGGCTGGTCTGG	1500
P/W/S Mutation	1441	GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGGCTGTCTTCGGCTGGTCTGG	1500

Wild	1501	GCACAATGGGATTGGGCTGCCTGCTGCAGCTGGTGTCTGTGGCTAACCCAGGTGTCA	1560
P/R Mutation	1501	GCACAATGGGATTGGGCTGCCTGCTGCAGCTGGTGTCTGTGGCTAACCCAGGTGTCA	1560
P/W Mutation	1501	GCACAATGGGATTGGGCTGCCTGCTGCAGCTGGTGTCTGTGGCTAACCCAGGTGTCA	1560
P/S Mutation	1501	GCACAATGGGATTGGGCTGCCTGCTGCAGCTGGTGTCTGTGGCTAACCCAGGTGTCA	1560
P/W/S Mutation	1501	GCACAATGGGATTGGGCTGCCTGCTGCAGCTGGTGTCTGTGGCTAACCCAGGTGTCA	1560

Wild	1561	CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTAGGAGCTGGCATTGA	1620
P/R Mutation	1561	CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTAGGAGCTGGCATTGA	1620
P/W Mutation	1561	CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTAGGAGCTGGCATTGA	1620
P/S Mutation	1561	CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTAGGAGCTGGCATTGA	1620
P/W/S Mutation	1561	CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTAGGAGCTGGCATTGA	1620

Wild	1621	TCCGCATTGAGAACCCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG	1680
P/R Mutation	1621	TCCGCATTGAGAACCCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG	1680
P/W Mutation	1621	TCCGCATTGAGAACCCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG	1680
P/S Mutation	1621	TCCGCATTGAGAACCCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG	1680
P/W/S Mutation	1621	TCCGCATTGAGAACCCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG	1680

Wild	1681	TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC	1740
P/R Mutation	1681	TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC	1740
P/W Mutation	1681	TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC	1740
P/S Mutation	1681	TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC	1740
P/W/S Mutation	1681	TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC	1740

Wild	1741	CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC	1800
P/R Mutation	1741	CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC	1800
P/W Mutation	1741	CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC	1800
P/S Mutation	1741	CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC	1800
P/W/S Mutation	1741	CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC	1800

Wild	1801	CTGCAGTCCGTGTAAACAAAGAAGAGTGAAGTCCGTGCCGCCATCAAGAAGATGCTCGAGA	1860
P/R Mutation	1801	CTGCAGTCCGTGTAAACAAAGAAGAGTGAAGTCCGTGCCGCCATCAAGAAGATGCTCGAGA	1860
P/W Mutation	1801	CTGCAGTCCGTGTAAACAAAGAAGAGTGAAGTCCGTGCCGCCATCAAGAAGATGCTCGAGA	1860
P/S Mutation	1801	CTGCAGTCCGTGTAAACAAAGAAGAGTGAAGTCCGTGCCGCCATCAAGAAGATGCTCGAGA	1860
P/W/S Mutation	1801	CTGCAGTCCGTGTAAACAAAGAAGAGTGAAGTCCGTGCCGCCATCAAGAAGATGCTCGAGA	1860

Wild	1861	CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA	1920
P/R Mutation	1861	CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA	1920
P/W Mutation	1861	CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA	1920
P/S Mutation	1861	CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA	1920
P/W/S Mutation	1861	CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA	1920

Wild	1921	TCCAAGTGGGGGCGCATCAAGGACATGATCCTGGATGGTGTGGCAGGACTGTGTATT	1980

Fig. 2 D

P/R Mutation	1921	TCCCAAGTGGGGGCGCATTCAAGGACATGATCCTGGATGGTGGATGGCAGGACTGTGTATT	1980
P/W Mutation	1921	TCCCAAGTGGGGGCGCATTCAAGGACATGATCCTGGATGGTGGATGGCAGGACTGTGTATT	1980
P/S Mutation	1921	TCCCAATTGGGGGCGCATTCAAGGACATGATCCTGGATGGTGGATGGCAGGACTGTGTATT	1980
P/W/S Mutation	1921	TCCCAATTGGGGGCGCATTCAAGGACATGATCCTGGATGGTGGATGGCAGGACTGTGTATT	1980

Wild	1981	AATCTATAATCTGTATGTTGGCAAAGCACCAGCCCGGCCTATGTTTGACCTGAATGACCC	2040
P/R Mutation	1981	AATCTATAATCTGTATGTTGGCAAAGCACCAGCCCGGCCTATGTTTGACCTGAATGACCC	2040
P/W Mutation	1981	AATCTATAATCTGTATGTTGGCAAAGCACCAGCCCGGCCTATGTTTGACCTGAATGACCC	2040
P/S Mutation	1981	AATCTATAATCTGTATGTTGGCAAAGCACCAGCCCGGCCTATGTTTGACCTGAATGACCC	2040
P/W/S Mutation	1981	AATCTATAATCTGTATGTTGGCAAAGCACCAGCCCGGCCTATGTTTGACCTGAATGACCC	2040

Wild	2041	ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT	2100
P/R Mutation	2041	ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT	2100
P/W Mutation	2041	ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT	2100
P/S Mutation	2041	ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT	2100
P/W/S Mutation	2041	ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT	2100

Wild	2101	ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA	2160
P/R Mutation	2101	ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA	2160
P/W Mutation	2101	ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA	2160
P/S Mutation	2101	ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA	2160
P/W/S Mutation	2101	ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA	2160

Wild	2161	GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA	2220
P/R Mutation	2161	GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA	2220
P/W Mutation	2161	GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA	2220
P/S Mutation	2161	GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA	2220
P/W/S Mutation	2161	GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA	2220

Wild	2221	TCATGTAAGTTTCTTGTCCTACATATCAATAATAAGAGAATAAAGTACTTCTATGCAAAA	2280
P/R Mutation	2221	TCATGTAAGTTTCTTGTCCTACATATCAATAATAAGAGAATAAAGTACTTCTATGCAAAA	2280
P/W Mutation	2221	TCATGTAAGTTTCTTGTCCTACATATCAATAATAAGAGAATAAAGTACTTCTATGCAAAA	2280
P/S Mutation	2221	TCATGTAAGTTTCTTGTCCTACATATCAATAATAAGAGAATAAAGTACTTCTATGTA AAA	2280
P/W/S Mutation	2221	TCATGTAAGTTTCTTGTCCTACATATCAATAATAAGAGAATAAAGTACTTCTATGTA AAA	2280

Wild	2281	AAAAAAAAAAAAAAAAAAAAA	2301
P/R Mutation	2281	AAAAAAAAAAAAAAAAAAAAA	2301
P/W Mutation	2281	AAAAAAAAAAAAAAAAAAAAA	2300
P/S Mutation	2281	AAAAAAAAAAAAAAAAA	2294
P/W/S Mutation	2281	AAAAAAAAAAAAAAAAA	2294

Fig.3

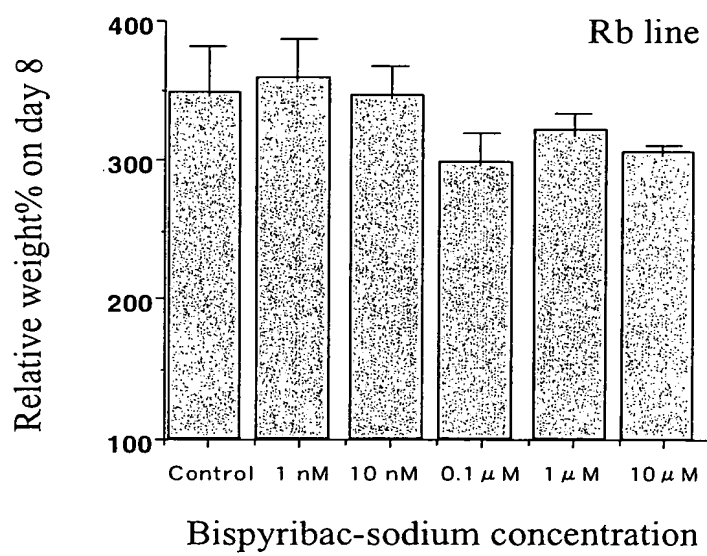


Fig. 4

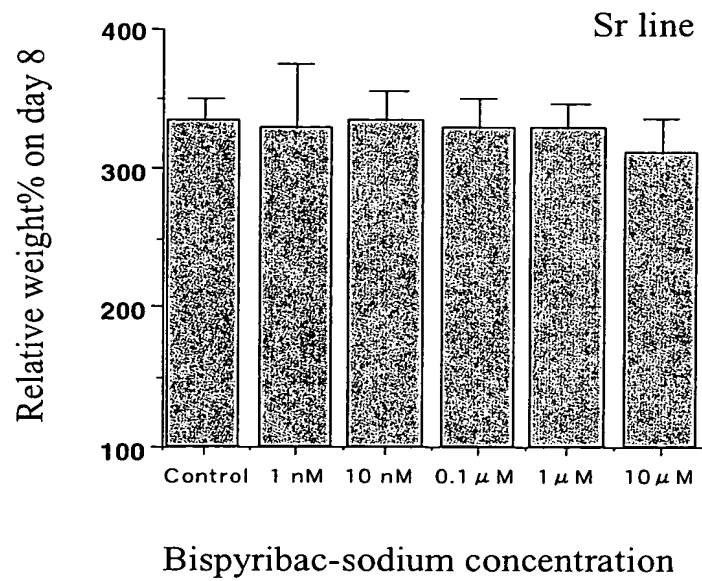


Fig. 5

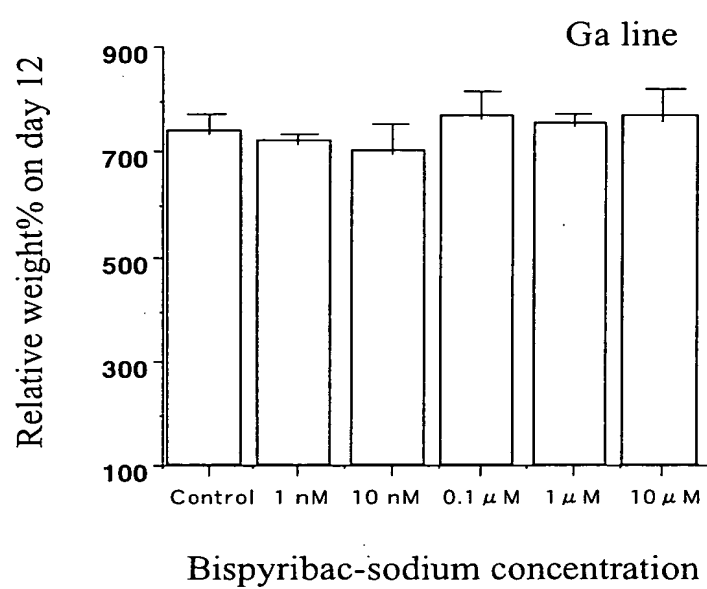


Fig. 6

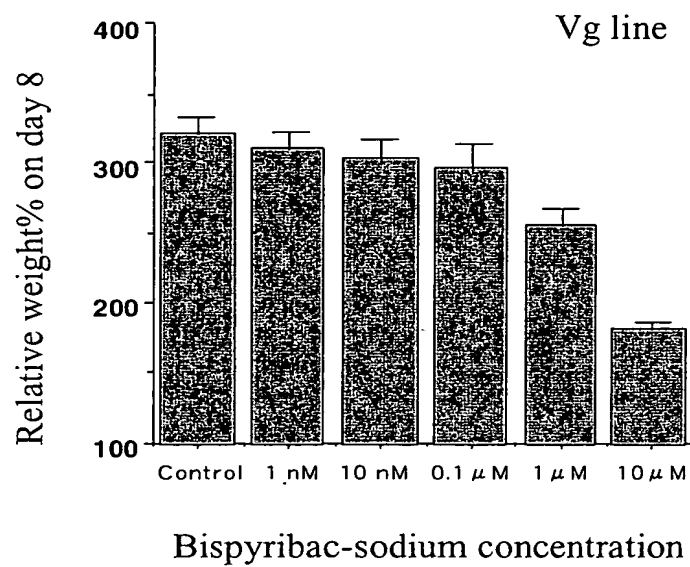


Fig. 7

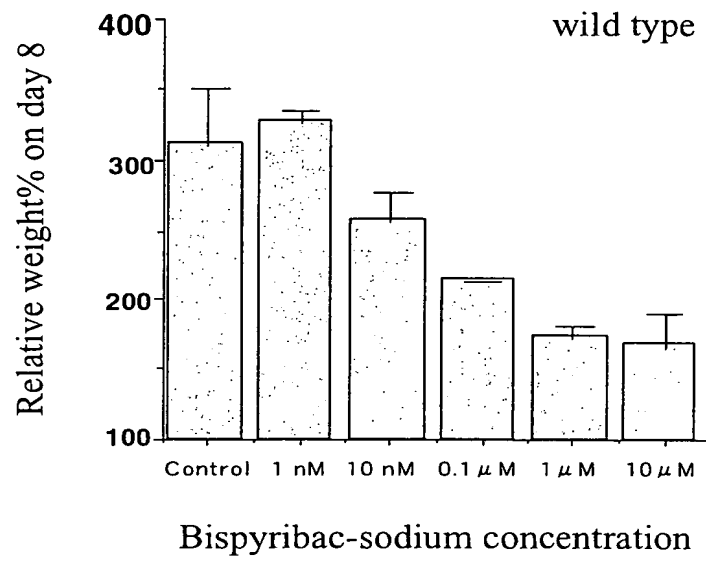


Fig. 8

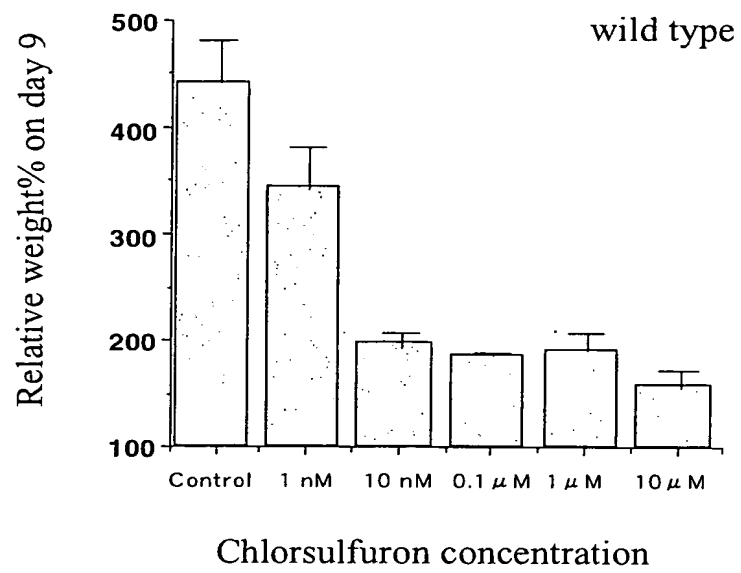


Fig. 9

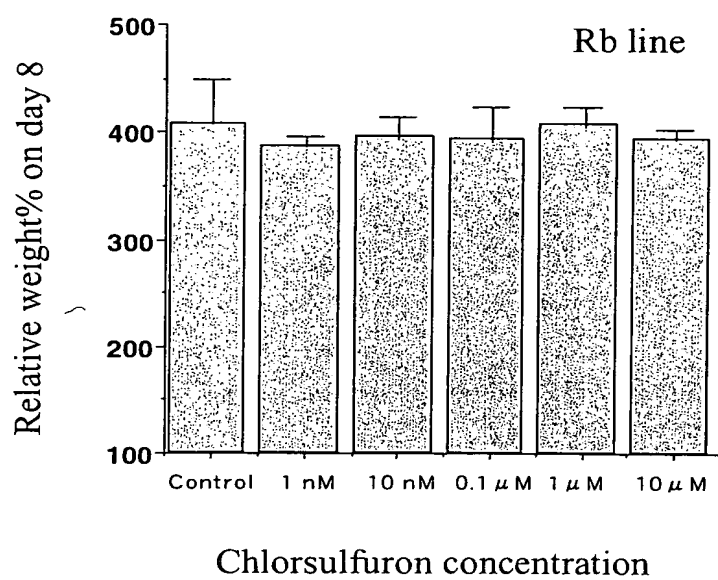


Fig. 1 0

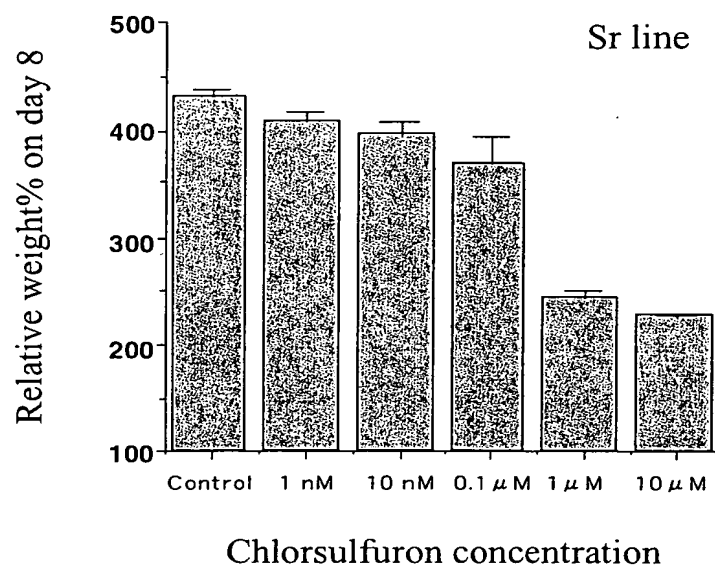


Fig. 1 1

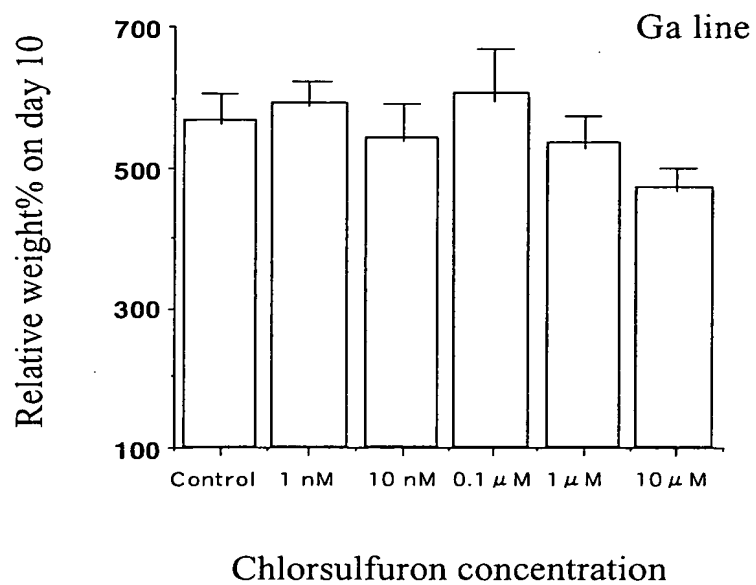


Fig. 1 2

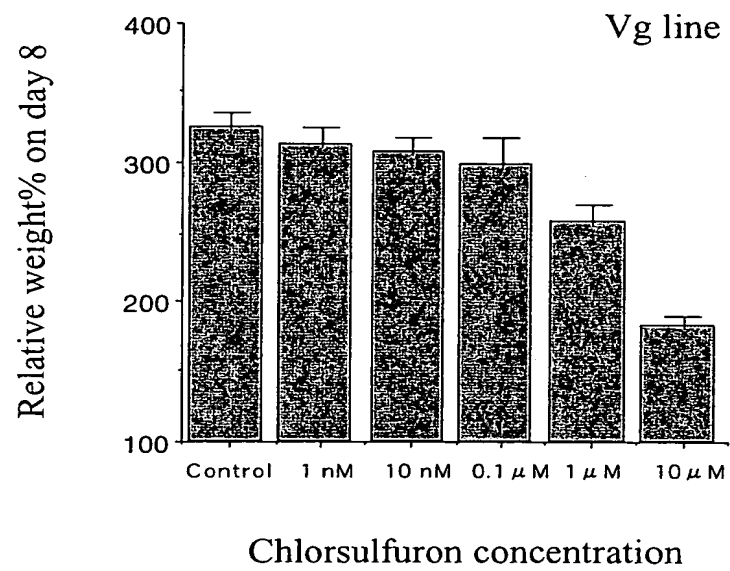


Fig. 1 3

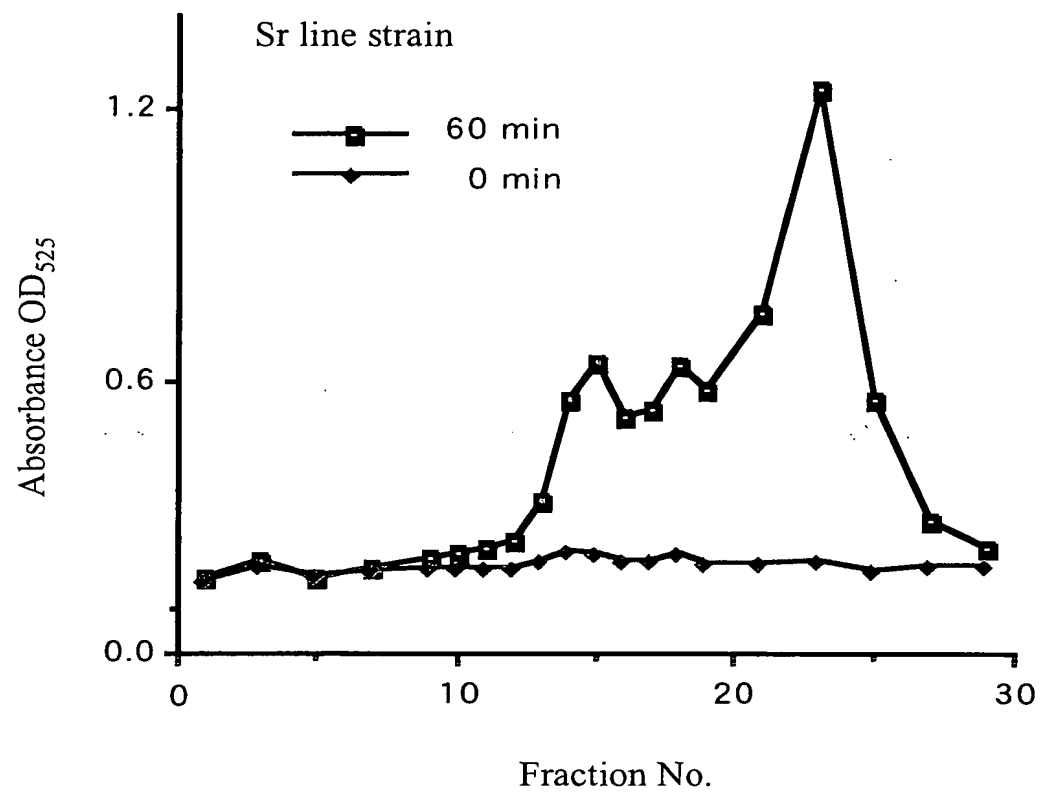


Fig. 1 4

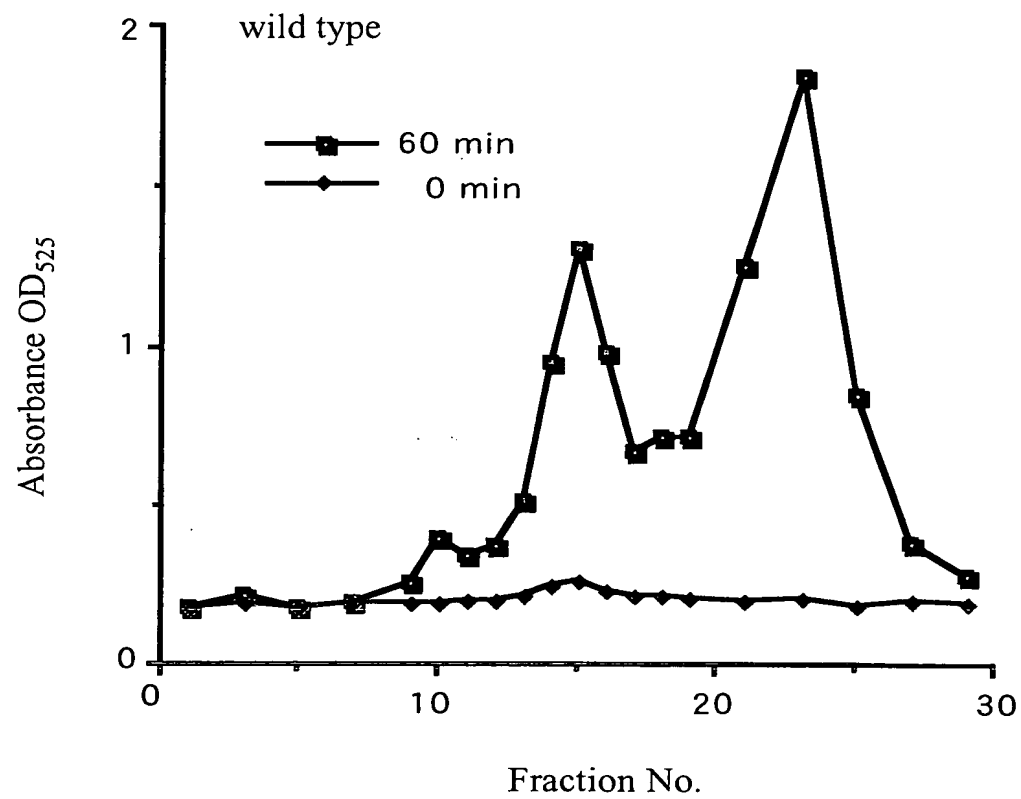


Fig. 1 5

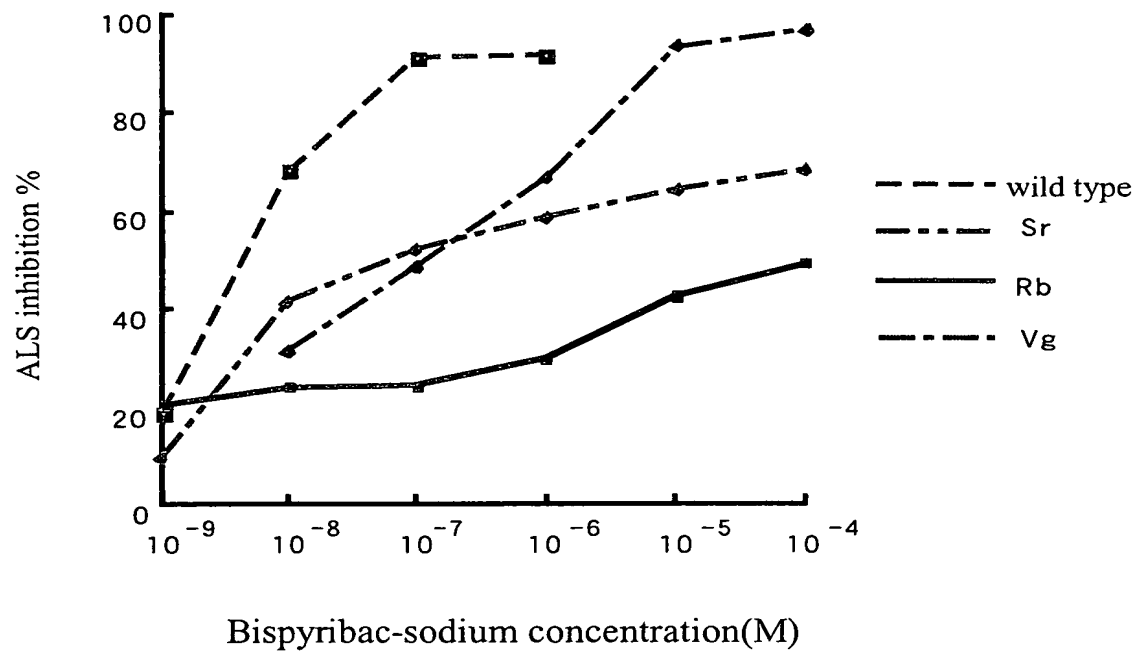


Fig. 1 6

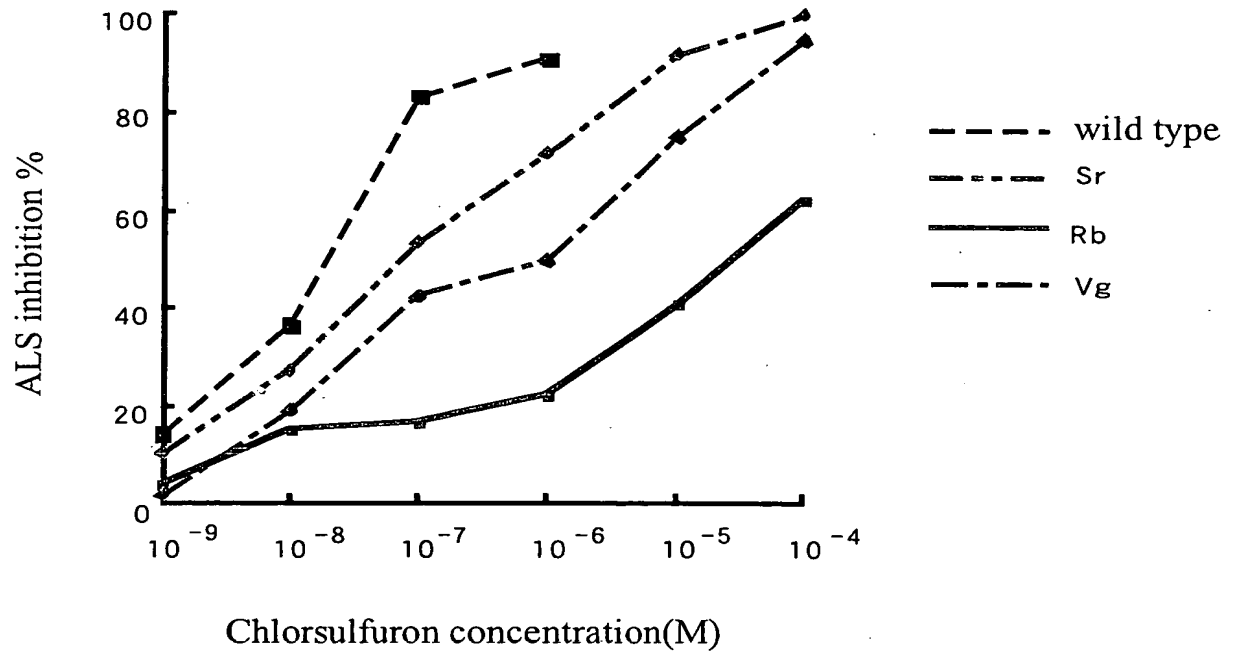


Fig. 17

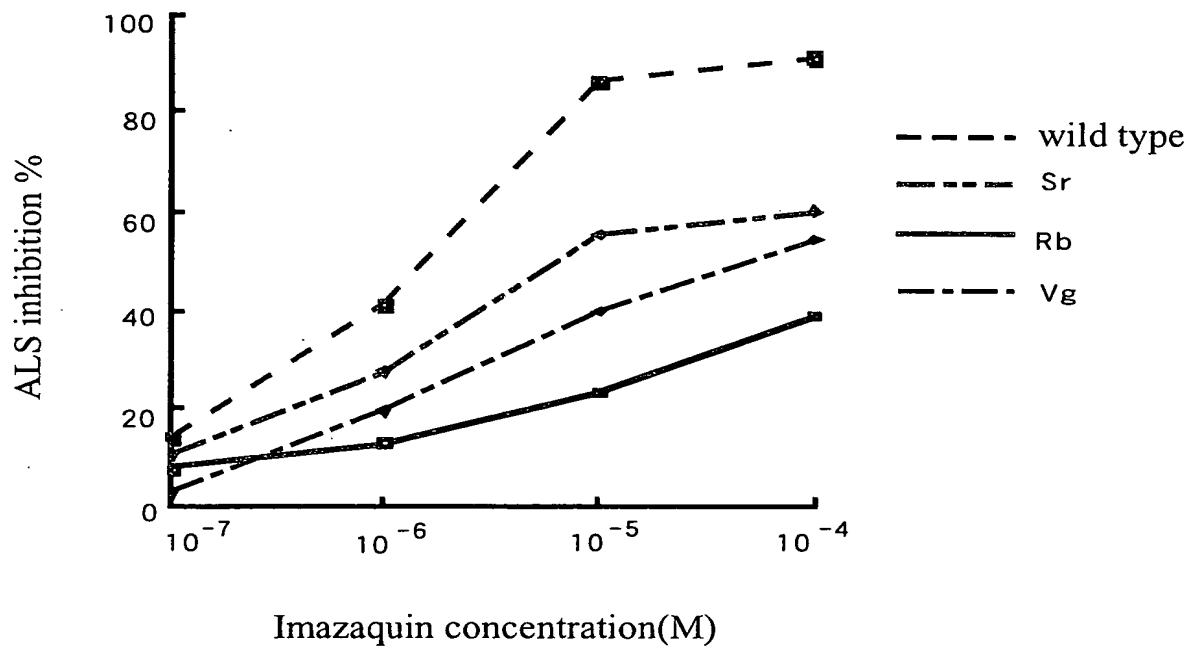


Fig. 1 8 A

1st Nucleotide Sequence

File Name : Nipponbare ALS partial cDNA
Sequence Size : 1505

2nd Nucleotide Sequence

File Name : X63554 maize ALS 1
Sequence Size : 2544

```

1' ACCCACGCGTCCGATGTGGAGGA
*** ** ** **
1141~ CATCGTCGAGGTCACCCGCTCCATCACCAGCACAACACCTGGTCTCGACGTCGACGA
24' CATCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCCTCGGGCCGTCCTGGCCCGGT
***** ** ** **
1201~ CATCCCCGCGTCGTGCAGGAGGCTTCTTCTCGCATCCTCTGGTCGCCCGGGCGGT
84' GCTGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTC
*** ** *****
1261~ GCTTGTGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGCTGGGACACGCC
144' GATGAATCTACCAGGGTACATCGCAGCGCTGCCAAGCCACCCGCGACAGAATTGCTTGA
*** ** ** *****
1321~ CATGAGTCTCGCTGGGTACATCGCGCGCTTCCCAAGCCTCCCGCGACTGAATTTCTTGA
204' GCAGGTCTTGCCTCTGGTGGCGAGTCACGGCGCCGATTCTCTATGTGCGGTGGTGGCTG
***** ** ** **
1381~ GCAGGTGCTGCGTCTTGTGGTGAATCACGGCGCCTGTTCTTATGTTGGCGGTGGCTG
264' CTCTGCATCTGGTGACGAATTGCGCTGGTTTGTGAGCTGACTGGTATCCAGTTACAAC
* *****
1441~ TGCAGCATCAGGTGAGGAGTTGTGCCGCTTGTGGAGTTGACTGGAATCCAGTCACAAC
324' CACTCTGATGGGCCTCGGCAATTTCCCAAGTACGACGCCGTTGTCCCTGCGCATGCTTGG
*****
1501~ TACTCTTATGGGCCTTGGCAACTTCCCAAGCAGCAGCCACTGTACTGCGCATGCTTGG
384' GATGCATGGCAGGTTGACGCAAATTATGCCGTGGATAAGGCTGACCTGTTGCTTGCCTT
***** ** ** **
1561~ TATGCATGGCAGGTGATGCAAATTATGCAAGTGGATAAGGCCGATCTGTTGCTTGCATT
444' TGGTGTGCGGTTTGATGATCGTGTGACAGGAAAAATTGAGGCTTTTGCAAGCAGGGCCAA
*****
1621~ TGGTGTGCGGTTTGATGATCGTGTGACAGGAAAAATTGAGGCTTTTGCAAGCAGAGCTAA
504' GATTGTGCACATTGACATTGATCCAGCAGAGATTGGAAGAACAAGCAACCACATGTGTC
*****
1681~ GATTGTGCACATTGATATTGATCCTGCTGAGATTGGCAAGAACAAGCAGCCACATGTGTC
564' AATTTGCGCAGATGTTAAGCTTGCTTTACAGGGCTTGAATGCTCTGCTACAACAGAGCAC
** ** *****
1741~ CATCTGTGCAGATGTTAAGCTTGCTTTGACAGGCATGAATACTCTTGGAAGGAAGCAC
624' AACAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGA
* *****
1801~ ATCAAAGAAGAGCTTGAAGCTTGGCTCATGGCATGATGAATTGGATCAGCAAAAGAGGGA
684' GTTTCCTCTGGGTACAAAACCTTTTGGTGAAGAGATCCACCGCAATATGCCATTAGGT
***** ** ** **
1861~ GTTTCCTCTGGATATAAAATCTTCAATGAGGAAATCCAGCCACAATATGCTATTAGGT
744' GCTGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCGAGCACCAGAT
* *****
1921~ TCTTGATGAGTTGACGAAGGGGAGGCCATCATTGCCACAGGTGTTGGGCGAGCACCAGAT
804' GTGGGCGGCACAATATTACCTACAAGCGGCCACGGCAGTGGCTGTCTTCCGCTGGTCT
*****
1981~ GTGGGCGGCACAGTATTACACTTACAAGCGGCCAAGGCAGTGGCTGTCTTCAAGCTGGTCT
864' GGGCGCAATGGGATTTGGGCTGCCTGCTGCAGCTGGTGTCTGTGGCTAACCCAGGTGT
** ** *****
2041~ TGGGGCTATGGGATTTGGTTTGGCGGCTGCTGCTGGTGTGCTGTGGCCAACCCAGGTGT
924' CACAGTTGTTGATATTGATGGGGATGGTAGCTTCTCATGAACATTCAGGAGCTGGCATT
*** *****

```

Fig. 1 8 B

2101" CACTGTTGTTGACATCGACGGAGATGGTAGCTTCCTCATGAACATTGAGGAGCTAGCTAT
 984' GATCCGCATTGAGAACCCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTGGGTAT

 2161" GATCCGTATTGAGAACCCTCCAGTCAAGGTCTTTGTGCTAAACAACCAGCACCTCGGGAT
 1044' GGTGGTGCAATGGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAA

 2221" GGTGGTGCAAGTGGGAGGACAGGTTCTATAAGGCCAATAGAGCACACACATTCTTGGGAAA
 1104' CCCGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACCTATTGCTAAGGGGTTCAATA
 *** **
 2281" CCCAGAGAACGAAAGTGAGATATATCCAGATTTTGTG-GCAATTGCTAAGGGGTTCAACA
 1164' TTCCTGCAGTCCGTGTAAACAAAGAAGTGAAGTCCGTGCCGCCATCAAGAAGATGCTCG

 2340" TTCCAGCAGTCCGTGTGACAAAGAAGAGCGAAGTCCATGCAGCAATCAAGAAGATGCTTG
 1224' AGACTCCAGGGCCATACTTGTTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTA
 **
 2400" AGGCTCCAGGGCCGTACCTCTTGGATATAATCGTCCCGCACCAGGAGCATGTGTTGCCTA
 1284' TGATCCCAAGTGGGGGCGCATTCAAGGACATGATCCTGGATGGTGTGGCAGGACTGTGT

 2460" TGATCCCTAGTGGTGGGCTTTCAAGGATATGATCCTGGATGGTGTGGCAGGACTGTGT
 1344' ATTAATCTATAATCTGTATGTTGGCAAAGCACCAGCCCGGCCTATGTTTGACCTGAATGA
 *** **
 2520" ATTGATCCGTTGACTGCAGGTCGAC

Fig. 19A

1st Nucleotide Sequence
 File Name : 2-point mutant full-length ALS cDNA
 2nd Nucleotide Sequence
 File Name : wild type full-length ALS cDNA

```

1'          CTCGCCGCCGCCGCCGCCACCACCCACCATGGCTACGACCG
*****
1" CCCAAACCCAGAAACCCTCGCCGCCGCCGCCGCCACCACCCACCATGGCTACGACCG

45' CCGCGGCCGCCGCCGCCGCCCTGTCCGCCGCCGCCGACGGCCAAGACGGCCGTAAGAACC
*****
61" CCGCGGCCGCCGCCGCCGCCCTGTCCGCCGCCGCCGACGGCCAAGACGGCCGTAAGAACC

105' ACCAGCGACACACGTCTTCCCGCTCGAGGCCGGGTGGGGGCCGCCGCCGTGAGGTGCT
*****
121" ACCAGCGACACACGTCTTCCCGCTCGAGGCCGGGTGGGGGCCGCCGCCGTGAGGTGCT

165' CGGCGGTGTCCCGGTACCCCGCGTCCCGGCCGCCGCCGCCACGCCGCTCCGGCCGT
*****
181" CGGCGGTGTCCCGGTACCCCGCGTCCCGGCCGCCGCCGCCACGCCGCTCCGGCCGT

225' GGGGGCCGCCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCCGTGGAGCGGTGCG
*****
241" GGGGGCCGCCGAGCCCGCAAGGGCGCGGACATCCTCGTGGAGGCCGTGGAGCGGTGCG

285' GCGTCAGCGACGTGTTGCGCTACCCGGCGCGCGCTCCATGGAGATCCACGAGCGCTGA
*****
301" GCGTCAGCGACGTGTTGCGCTACCCGGCGCGCGCTCCATGGAGATCCACGAGCGCTGA

345' CGCGCTCCCGGTATCACCACACCTCTTCCGCCACGAGCAGGGCGAGGCGTTGCGCG
*****
361" CGCGCTCCCGGTATCACCACACCTCTTCCGCCACGAGCAGGGCGAGGCGTTGCGCG

405' CGTCCGGGTACGCCGCCGCGTCCGGCCGCGTGGGGTCTGCGTCCGCACCTCCGGCCCCG
*****
421" CGTCCGGGTACGCCGCCGCGTCCGGCCGCGTGGGGTCTGCGTCCGCACCTCCGGCCCCG

465' GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGCTCG
*****
481" GGGCAACCAACCTCGTGTCCGCGCTCGCCGACGCGCTGCTCGACTCCGTCCCGATGCTCG

525' CCATCAGGGCCAGGTCCCCCGCCGATGATCGGCACGACGCTTCCAGGAGACGCCCA
*****
541" CCATCAGGGCCAGGTCCCCCGCCGATGATCGGCACGACGCTTCCAGGAGACGCCCA

585' TAGTCGAGGTACCCGCTCCATCACCAGCACAATTACCTTGCTTGTGAGGAGACA
*****
601" TAGTCGAGGTACCCGCTCCATCACCAGCACAATTACCTTGCTTGTGAGGAGACA

645' TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCTCGGGCCGTCTGGCCCGGTGC
*****
661" TCCCCCGCGTCATACAGGAAGCCTTCTTCTCGCGTCTCGGGCCGTCTGGCCCGGTGC

705' TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA
*****
721" TGGTCGACATCCCCAAGGACATCCAGCAGCAGATGGCCGTGCCGGTCTGGGACACCTCGA

765' TGAATCTACAGGGTACATCGCAGCCTGCCCAAGCCACCGCGACAGAATTGCTTGAGC
*****
781" TGAATCTACAGGGTACATCGCAGCCTGCCCAAGCCACCGCGACAGAATTGCTTGAGC

825' AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTCGGTGGTGGCTGCT
*****
841" AGGTCTTGCGTCTGGTTGGCGAGTCACGGCGCCCGATTCTCTATGTCGGTGGTGGCTGCT

885' CTGCATCTGGTGACGAATTGCGCTGTTTGTGAGTGACTGGTATCCAGTTACAACCA
*****
901" CTGCATCTGGTGACGAATTGCGCTGTTTGTGAGTGACTGGTATCCAGTTACAACCA

945' CTCTGATGGGCCTCGGCAATTTCCCCAGTGACGACCCGTTGTCCTGCGCATGCTTGGGA
*****
961" CTCTGATGGGCCTCGGCAATTTCCCCAGTGACGACCCGTTGTCCTGCGCATGCTTGGGA

1005' TGCATGGCAGGTGTACGCAAAATTATGCCGTGGATAAGGCTGACCTGTTGCTTGCCTTGG

```


Fig. 19B

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*****
1021~ TGCATGGCAGGTTGACGCAAATTATGCCGTGGATAAGGCTGACCTGTTGCTTGCCTTTG
1065' GTGTGCGGTTTGATGATCGTGTGACAGGGAAAATTGAGGCTTTTGAAGCAGGGCCAAGA
*****
1081~ GTGTGCGGTTTGATGATCGTGTGACAGGGAAAATTGAGGCTTTTGAAGCAGGGCCAAGA
1125' TTGTGCACATTGACATTGATCCAGCAGAGATTGAAAGAACAAGCAACCACATGTGTCAA
*****
1141~ TTGTGCACATTGACATTGATCCAGCAGAGATTGAAAGAACAAGCAACCACATGTGTCAA
1185' TTTGCGCAGATGTTAAGCTTGTCTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA
*****
1201~ TTTGCGCAGATGTTAAGCTTGTCTTACAGGGCTTGAATGCTCTGCTACAACAGAGCACAA
1245' CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT
*****
1261~ CAAAGACAAGTTCTGATTTTAGTGCATGGCACAATGAGTTGGACCAGCAGAAGAGGGAGT
1305' TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCACCGCAATATGCCATTAGGTGC
*****
1321~ TTCCTCTGGGGTACAAAACCTTTTGGTGAAGAGATCCACCGCAATATGCCATTAGGTGC
1365' TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT
*****
1381~ TGGATGAGCTGACGAAAGGTGAGGCAATCATCGCTACTGGTGTGGGCAGCACCAGATGT
1425' GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGCGTGTCTTCGGCTGGTCTGG
*****
1441~ GGGCGGCACAATATTACACCTACAAGCGGCCACGGCAGTGCGTGTCTTCGGCTGGTCTGG
1485' GCGCAATGGGATTTGGGCTGCCTGCTGCAGCTGGTGTCTCTGTGGCTAACCCAGGTGTCA
*****
1501~ GCGCAATGGGATTTGGGCTGCCTGCTGCAGCTGGTGTCTCTGTGGCTAACCCAGGTGTCA
1545' CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTCAGGAGCTGGCATTGA
*****
1561~ CAGTTGTTGATATTGATGGGGATGGTAGCTTCCTCATGAACATTCAGGAGCTGGCATTGA
1605' TCCGCATTGAGAACCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG
*****
1621~ TCCGCATTGAGAACCTCCCTGTGAAGGTGATGGTGTGAACAACCAACATTTGGGTATGG
1665' TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC
*****
1681~ TGGTGCAATTGGAGGATAGGTTTTACAAGGCGAATAGGGCGCATACATACTTGGGCAACC
1725' CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC
*****
1741~ CGGAATGTGAGAGCGAGATATATCCAGATTTTGTGACTATTGCTAAGGGGTTCAATATTC
1785' CTGCAGTCCGTGTAACAAAGAAGAGTGAAGTCCGTGCCGCATCAAGAAGATGCTCGAGA
*****
1801~ CTGCAGTCCGTGTAACAAAGAAGAGTGAAGTCCGTGCCGCATCAAGAAGATGCTCGAGA
1845' CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA
*****
1861~ CTCCAGGGCCATACTTGTGGATATCATCGTCCCGCACCAGGAGCATGTGCTGCCTATGA
1905' TCCCAATTGGGGGCGCATTCAAGGACATGATCCTGGATGGTATGGCAGGACTGTGTATT
*****
1921~ TCCCAAGTGGGGGCGCATTCAAGGACATGATCCTGGATGGTATGGCAGGACTGTGTATT
1965' AATCTATAATCTGTATGTTGGCAAAGCACCAGCCGGCCTATGTTTGACCTGAATGACCC
*****
1981~ AATCTATAATCTGTATGTTGGCAAAGCACCAGCCGGCCTATGTTTGACCTGAATGACCC
2025' ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT
*****
2041~ ATAAAGAGTGGTATGCCTATGATGTTTGTATGTGCTCTATCAATAACTAAGGTGTCAACT
2085' ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA
*****
2101~ ATGAACCATATGCTCTTCTGTTTACTTGTGTTGATGTGCTTGGCATGGTAATCCTAATTA
2145' GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA

```

Fig. 1 9 C

```
*****  
2161" GCTTCCTGCTGTCTAGGTTTGTAGTGTGTTGTTTCTGTAGGCATATGCATCACAAGATA  
2205' TCATGTAAGTTTCTTGTCTACATATCAATAATAAGAGAATAAAGTACTTCTATGTAAAA  
*****  
2221" TCATGTAAGTTTCTTGTCTACATATCAATAATAAGAGAATAAAGTACTTCTATGCAAAA  
2265' AAAAAAAAAAAAAA  
*****  
2281" AAAAAAAAAAAAAAAAAA
```

Fig. 2 0

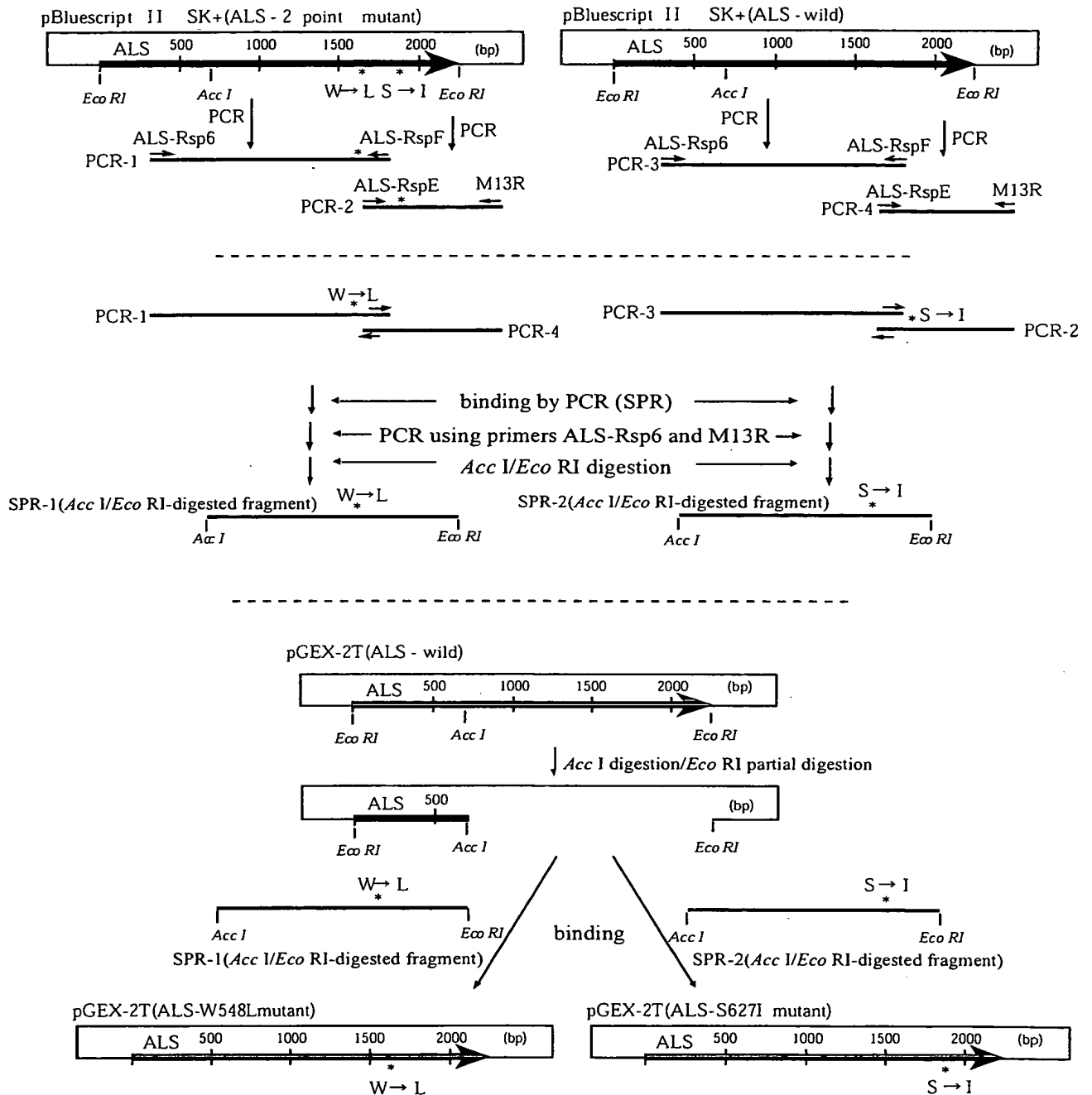


Fig. 2 1

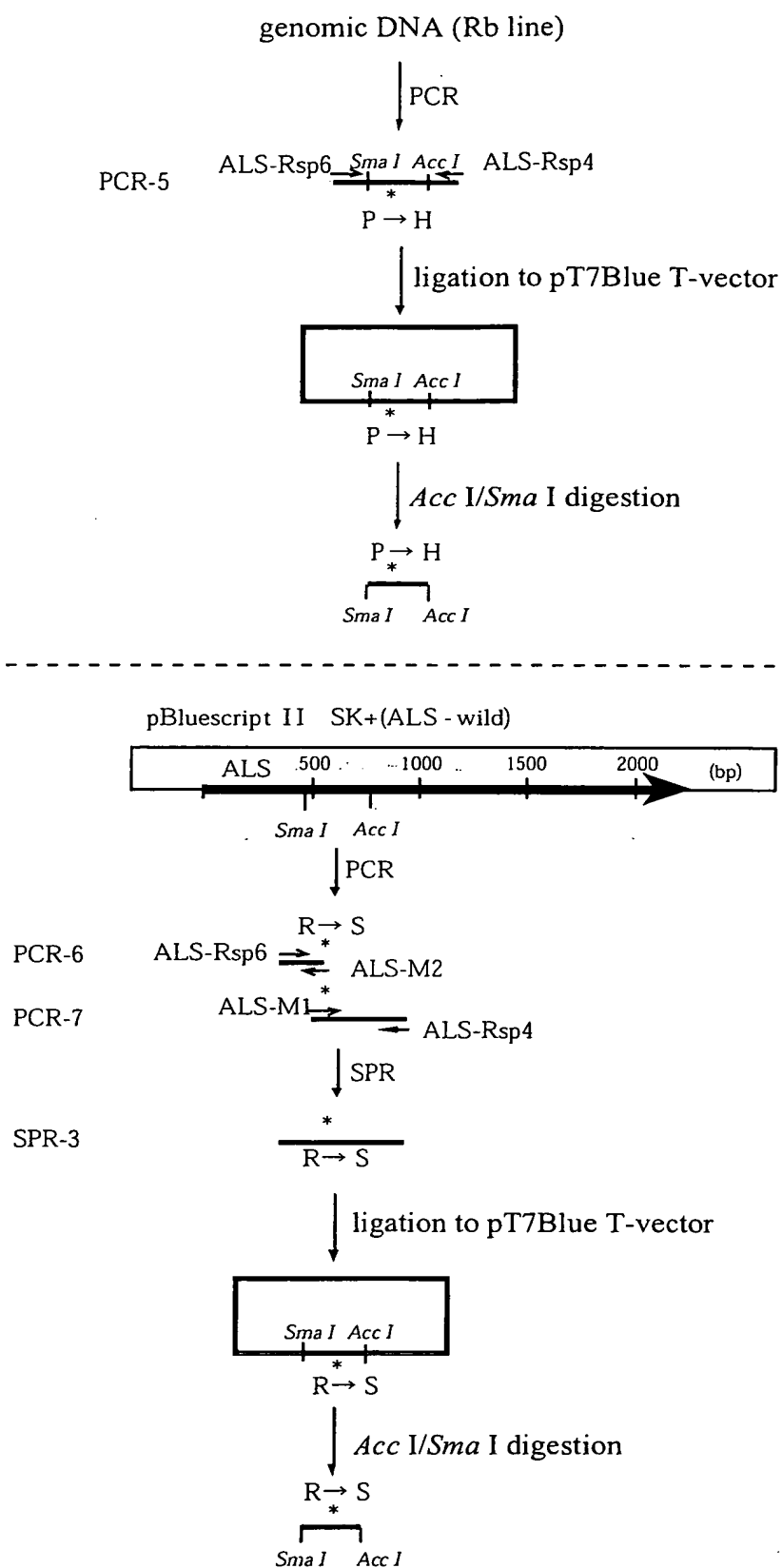


Fig. 2 2

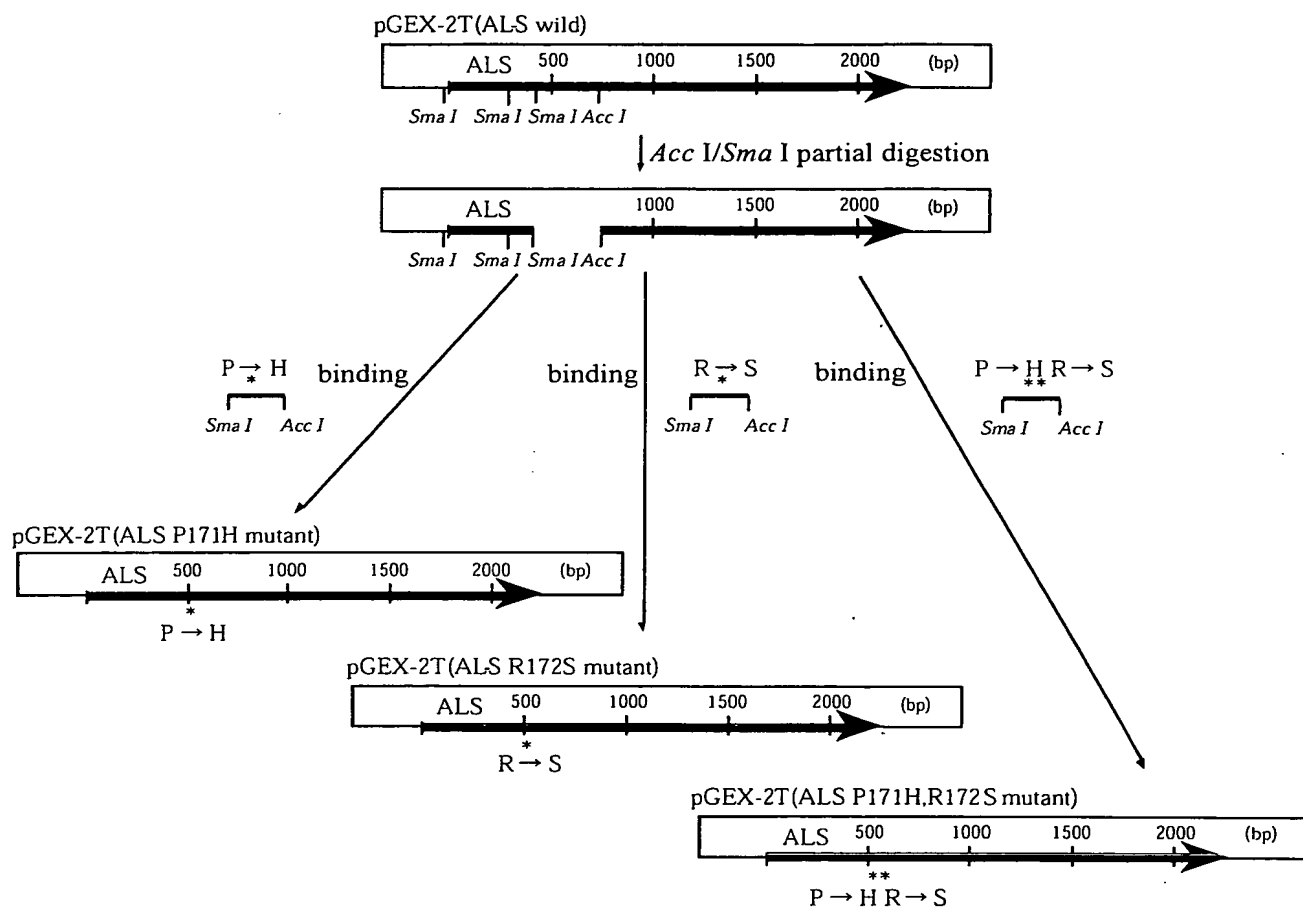


Fig. 2 3

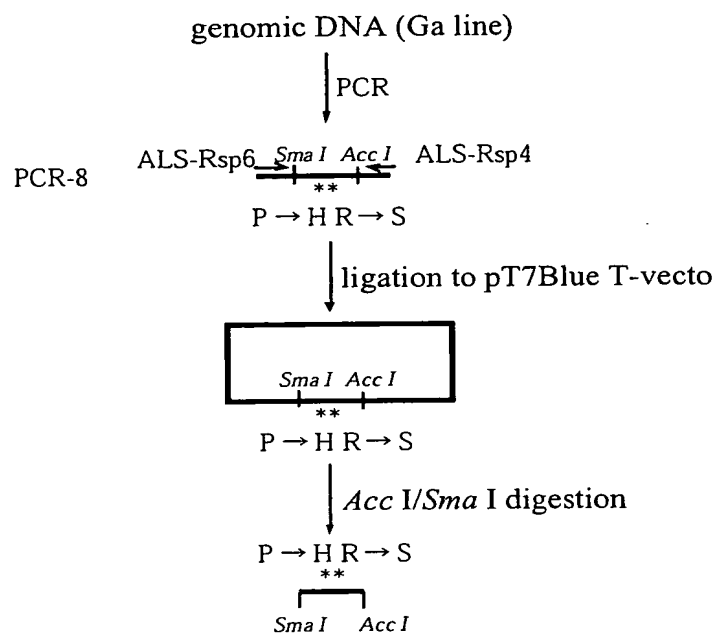


Fig. 2 4

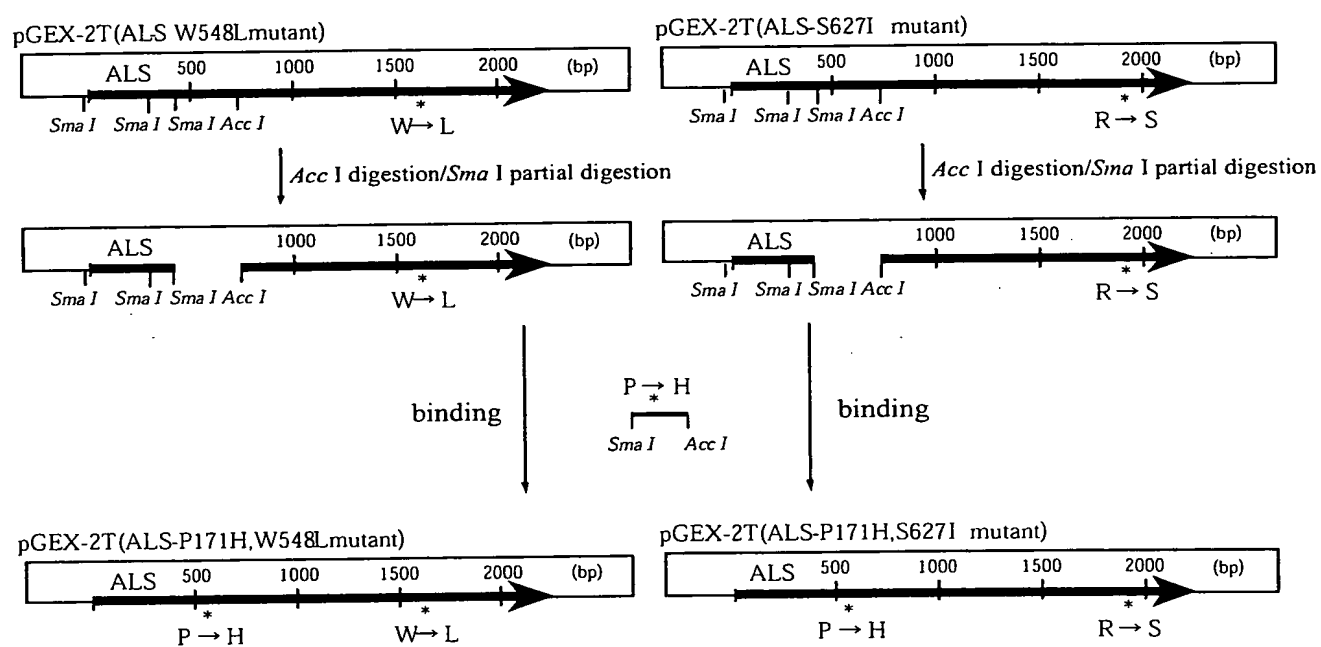


Fig. 2 5

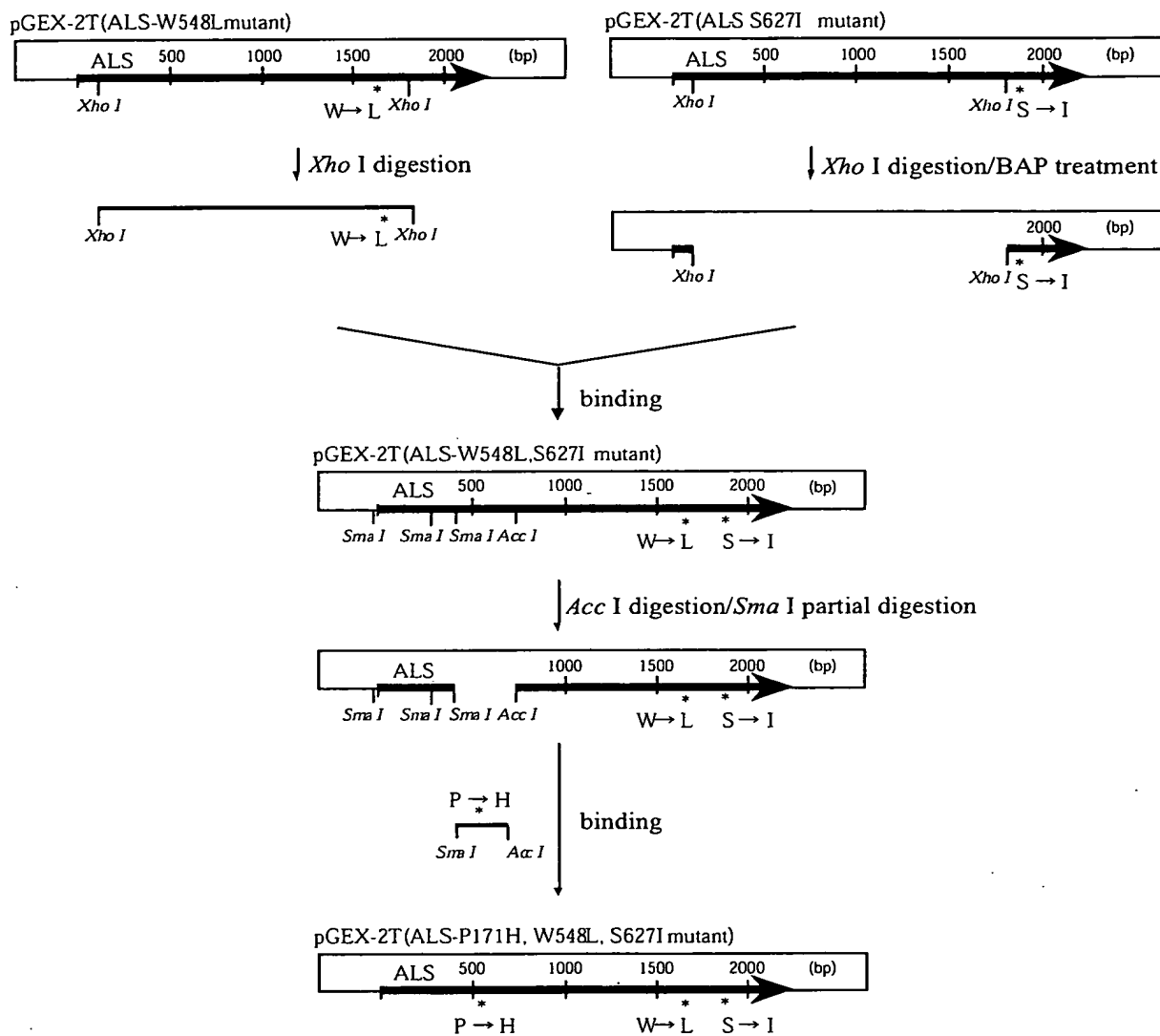


Fig. 2 6

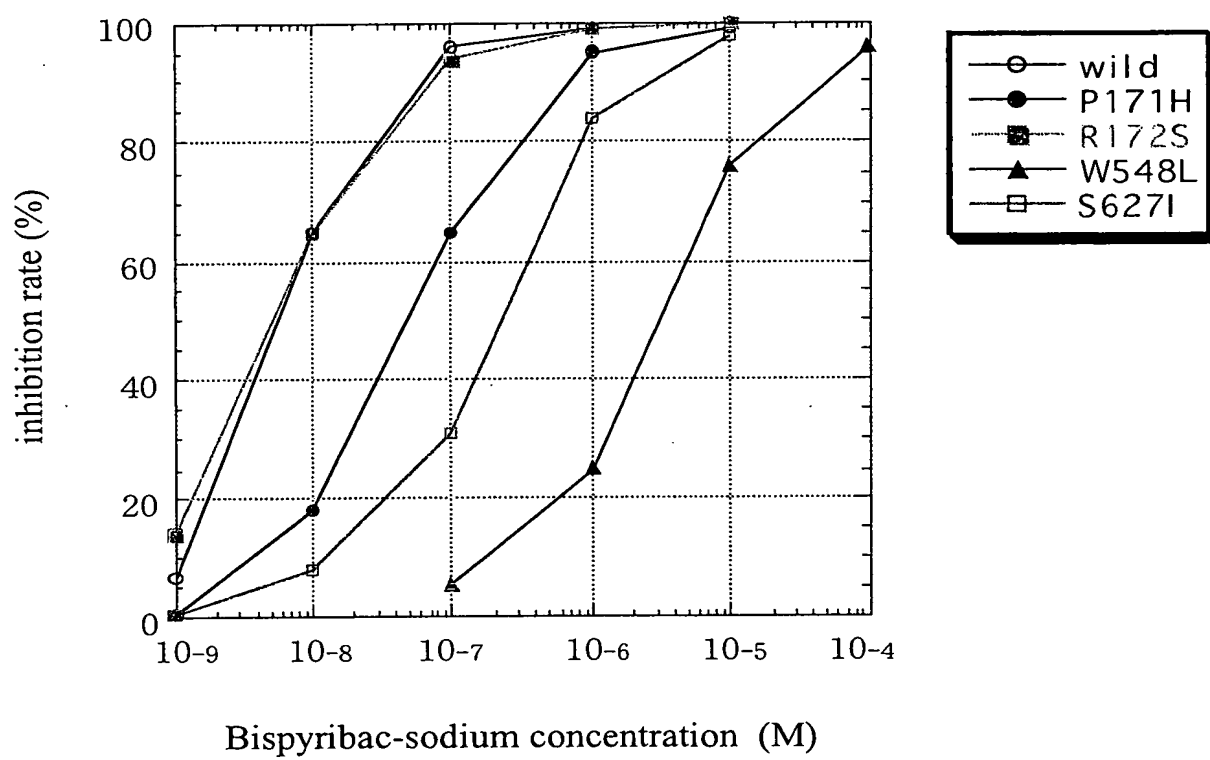


Fig. 2 7

